

British S. S. *Rapidan*:

Gale began on the 29th, wind NW. Lowest barometer 29.65 inches at noon on the 29th, wind WNW., 4, in latitude 40° 56' N., longitude 47° 07' W. End on the 30th, wind WNW. Highest force of wind 9; steady WNW.

Danish S. S. *Frederik VIII*:

Gale began on the 29th, wind S. Lowest barometer 29.43 inches at 8 p. m. on the 29th, wind SSE., in latitude 46° N., longitude 38° 21' W. End on the 30th, wind W. Highest force of wind 11; shifts SSE.-SSW.

Italian S. S. *Georgia*:

Gale began on the 30th, wind SSE. Lowest barometer 29.38 inches at 6.27 a. m. on the 31st, wind SSW., in latitude 36° 56' N., longitude 65° 03' W. End on the 31st, wind NNE. Highest force of wind 10; shifts SSW.-W.-NW.-N.

American S. S. *City of Freeport*:

Gale began on the 31st, wind SW. Lowest barometer 29.91 inches at 1 a. m. on April 1, wind SW., 8, in latitude 42° 10' N., longitude 43° 12' W. End on April 1, wind W. Highest force of wind 8, SW., shifts SW.-W.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

A considerable amount of cloudy, stormy weather occurred over the North Pacific during March; and among the important disturbances of the month was the typhoon which passed near Guam during the last decade. Over the northern and middle routes the seas were frequently heavy to very rough, and several vessels reported delayed progress in the face of mountainous waves. Wind velocities, however, were not unusually high, and few gales of greater force than 10 were reported.

At Honolulu the weather was unusually windy, with prevailing wind from the east. The average hourly velocity was 9.7 miles. The highest velocity, nevertheless, was only 40 miles, this occurring with an east wind on the 8th, but there were 7 days with velocities in excess of 24 miles. Cloudy skies prevailed and the total precipitation, 6.36 inches, was 3.16 inches above the normal.

It is interesting to note the precipitation conditions along the American coast from San Diego to Juneau. At the California coast stations the rainfall was much below the normal for the month, and at San Diego the percentage of sunshine was the highest ever recorded in March. To the northward of San Francisco precipitation increased, until at North Head it was slightly more than half the normal amount; while at Juneau it was more than double the normal. The total snowfall at Juneau was 39.7 inches, which is the greatest amount of the past 20 years in March, and more than three times the normal.

Of the storms that entered the ocean from the Asiatic continent, most of them seem to have sprung from Mongolia and Siberia. The winter high pressure area overlay eastern China and the adjacent seas during the greater part of the month, and so far as known the only cyclones or depressions of consequence to this region were the two which occurred on the 7th-8th, and on the 10th. Both of these moved northeastward over Japan.

Of the more northern cyclones proceeding from the continent, that of the 2d and 3d gave fresh to whole gales over the sea to the eastward of Japan, and was perhaps the most intense. The British S. S. *Bessie Dollar*, while in and near latitude 34° N., longitude 144° 29' E., on the 3d, encountered southwesterly to northwesterly gales, force 10, lowest pressure 29.70 inches. On the same day

the American S. S. *West Prospect*, while in latitude 34° 39' N., longitude 146° 18' E., experienced westerly to northwesterly gales, force 9, lowest pressure 29.65 inches. Several vessels also reported gales from the same locality on the 11th to 14th, accompanied by rain, hail, and tremendous seas, though with only moderately low pressures.

On the 16th to 20th several steamships encountered stormy weather between about latitudes 33° and 50° N., longitudes 160° and 177° E. Among them the American schooner *Bakersfield*, while westward bound in latitude 49° 36' N., longitude 168° 15' E., on the 18th, was beset by extraordinarily high seas, raised by a steady northeast gale, highest force 11; the lowest pressure was 29.84 inches. On the same date the Japanese S. S. *Iyo Maru* experienced a steady north-northwest gale, force 10, in latitude 44° 43' N., longitude 163° 24' E., and the American S. S. *West Kader* a steady northeast gale, highest force 10, lowest pressure 29.62 inches, in latitude 50° 12' N., longitude 176° 15' E. These gales were associated with a storm center in the Aleutian area.

On the 21st a rapidly moving disturbance was central near latitude 45° N., longitude 153° E. The *Bakersfield*, in the vicinity, reported a northeast gale, force 10, lowest pressure 29.48 inches.

On the 31st the lowest pressures of the month occurred, apparently owing to an intensification of a LOW over the western Aleutian area. The condition continued through the following day and into the 2d of April. The lowest observed pressure on the 31st was 28.66 inches, noted in latitude 45° 15' N., longitude 173° 15' E., by the American S. S. *Dewey*; but on April 1 the region was swept by storm and hurricane winds, and the low reading of 28.24 inches was observed.

One of the most important storms of the month was the typhoon that passed near Guam on the 25th and 26th. This seems to have appeared as a depression over the central portion of the Caroline Archipelago on the 21st or 22d. It moved eastward, slowly developing, and at 8 p. m. of the 25th (Eastern time) the center was south of Guam, as evidenced by the observation at that point: Wind east, force 9, pressure 29.08 inches. Twenty four hours later the wind at Guam was south, force 6, pressure 29.18 inches; and at 8 p. m. of the 27th, though the wind was light from the south, the pressure was still as low as 29.48 inches. The typhoon did considerable damage on the island. From the Marianas it apparently moved west-northwestward, recurving shortly afterward toward the north and passing to the eastward of the Bonin Islands. On the 29th the U. S. Transport *Meigs* received a radio report of a typhoon in the vicinity of Guam, and while in latitude 32° 47' N., longitude 140° 23' E., experienced falling pressure, wind shifting from southeast into east and northeast, and an increasing ocean swell. At 4 p. m. of the 30th, while near latitude 33° N., longitude 144° E., the *Meigs* experienced lowest pressure 29.53 inches, with a fresh northerly breeze and a northeast swell. It is not known whether the typhoon died out at this time or entered the area of disturbance then increasing in energy over the western Aleutians.

Over the eastern waters of the Pacific only one storm of consequence developed in lower latitudes. That seems to have formed near the Hawaiian Islands on the 26th. Honolulu on that date recorded the lowest pressure of the month, 29.76 inches, though without accompanying gale winds. On the 27th, however, this station recorded a maximum wind velocity of 35 miles from the northeast, and several vessels to the eastward were

experiencing increasing winds and falling pressure. On the 28th the storm was moving northward with increased energy, and at noon the American S. S. *West Ivan*, while in latitude $37^{\circ} 11' N.$, longitude $143^{\circ} 23' W.$, observed the lowest pressure reported, 28.97 inches, the wind shortly thereafter increasing to force 10, from the west. During the 28th this cyclone seems to have decreased in energy with northward movement, although westerly winds, force 9, occurred near latitude $37^{\circ} N.$, between longitudes 141° and $145^{\circ} W.$, during the morning hours. On the two following days what remained of the storm lay off the coasts of Washington and British Columbia, and from it an offshoot depression entered the continent.

Off the coasts of Mexico and Central America generally fine weather prevailed. At least one depression formed in this region, however, and that on the afternoon of the 19th and the morning of the 20th. The American tanker *A. C. Bedford*, while in latitude $14^{\circ} 35' N.$, longitude $95^{\circ} 50' W.$, on the 19th, experienced a northeasterly gale, highest force 9. Early on the 20th the American S. S. *American*, southward bound, experienced a similar gale in $14^{\circ} 30' N.$, $96^{\circ} 28' W.$, lowest pressure 29.86 inches. At 9 a. m. of this date the *American* sighted a "large waterspout without visible movement" in $15^{\circ} 36' N.$, $98^{\circ} 20' W.$

Over the northern area, that is, within the region embraced by the Gulf of Alaska and the Aleutians, considerable storm activity occurred during the month. The Aleutian LOW showed somewhat the customary double-center formation with more or less shifting along the parallels, but the westernmost center was the stronger and more persistent. Individual offshoots from the LOW in the Alaskan region entered the Canadian Northwest on the 3d, 6th, 10th, 15th, 18th, 21st, 23d, and 27th of the month.

The North Pacific HIGH was well-developed during most of March, and was seriously disturbed only by the storm which began in the Hawaiian region on the 26th.

Pressure was below normal by small amounts over the eastern part of the ocean, as shown by observations at the island stations, the greatest deficiency being in the region of the Hawaiian Islands. The average pressure at Dutch Harbor, based on p. m. reports, was 29.73 inches, 0.04 inch below normal. The highest pressure, 30.34 inches, occurred on the 11th; the lowest, 28.74, on the 8th. Absolute range 1.60 inches. At Honolulu the average p. m. pressure was 29.97 inches, or 0.07 inch below normal. The highest pressure, 30.15 inches, occurred on the 9th; the lowest, 29.76, on the 26th. At Midway Island the average p. m. pressure was 30.09, or 0.01 inch below normal. The highest pressure, 30.36 inches, occurred on the 11th; the lowest, 29.78, on the 29th and 30th.

On the 26th and 27th two vessels, the American S. S. *West Keats* and the Japanese S. S. *Boston Maru*, reported ice floes between latitudes 43° and $44^{\circ} N.$, longitudes $145^{\circ} 47'$ and $148^{\circ} 42' E.$ The fields were often several miles apart, and the ice 3 to 5 feet in thickness.

More fog occurred in March than during any of the preceding three months, and it was more generally widespread along the northern and middle latitudes. There was scarcely a day in which it was not reported from some portion of the North Pacific area. In the South Pacific fog was noted on the 23d and 24th from the 7th parallel southward for some distance along the coast of Peru.

SOUTH PACIFIC CYCLONE OF FEBRUARY-MARCH, 1923.

By WILLIS E. HURD.

The American S. S. *Vinita*, Captain Holsen, observer Chas. H. McKean, while on a voyage from Honolulu toward Auckland, New Zealand, encountered rough weather during the last of February and the 1st of March (Greenwich dates) while near latitude $30^{\circ} S.$, and the 180th meridian. On February 27 the vessel received radio warning from Wellington, New Zealand, of a storm central north of Cape Maria and an ocean forecast of east to northeast gales. On the morning of the 28th, while the *Vinita* was in latitude $28^{\circ} 59' S.$, longitude $179^{\circ} 30' E.$ the weather became squally and pressure began falling rapidly. By 2 p. m. the seas were mountainous, with wind from the north, force 8-9, pressure 29.25 inches. At 8 p. m. the sky partly cleared and the weather moderated, with the glass at its lowest, 29.12 inches, in D. R. latitude $30^{\circ} 20' S.$, longitude $178^{\circ} 05' E.$ At 11.15 p. m. the vessel hove to in a southerly wind, buffeted about by cross changing to southerly seas. Shortly after midnight the wind went into the southeast, force 9, and remained in this quarter during the forenoon of March 1, gradually moderating, with rising pressure, so that the vessel was able to resume her course by 9 a. m.

NOTES ON WEATHER IN OTHER PARTS OF THE WORLD.

Newfoundland.—ST. JOHNS, March 15.—The sealing fleet, which sailed from this port for the Grand Banks a week ago is jammed in an immense ice field off the coast of Newfoundland.—*New York Tribune*, March 16, 1923.

ST. JOHNS, March 31.—Service on the Newfoundland Railway suspended because of the blizzard [Mar. 29] has not been resumed as yet. Off the coast the storm is still raging. Many vessels remain frozen in the ice fields, and the sealing fleet reported by radio to-day that it was unable to move owing to the ice pack.—*New York Tribune*, March 31, 1923.

British Isles.—Unusually high day temperatures were registered about the 27th. At Kew Observatory, Richmond, a maximum of $68^{\circ} F.$ occurred on that date. Such a temperature has only once before been recorded there in March during the past 50 years. * * *

The rainfall of the month was above the average in parts of the south of the British Isles but less than half the average fall in the northern half of Scotland.¹

France.—Early in the month stormy weather with much rain and violent thunderstorms occurred in France, and heavy floods were reported on the Seine, parts of Paris being flooded, and on many other rivers from the 1st to about the 8th. There was some loss of life.¹

Asia Minor.—On the 23d, the Tigris was reported as rising to an unprecedented height in consequence of heavy rains and the melting of snow in Kurdistan; a day or two later it burst its banks, flooding 300 square miles of desert and isolating Baghdad.¹

Africa.—Heavy rains in Nyasaland in the middle of March did great damage to the tobacco crop, and caused destructive floods on the Zambesi on the 19th and 20th, which interrupted railway communications. On the 26th the floods were subsiding.¹

¹ *Meteorological Magazine*, April 1923, pp. 68-69.